



# **Integrating Green and Sustainable Practices with Navy's Remediation Projects**

Environment, Energy & Sustainability Symposium  
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# NAVFAC Emphasis on Sustainability



- **DON Environmental Strategy, April 2008**

- Vision "Sustaining our Environment, Protecting our Freedom"
  - Links accomplishing Navy's warfighting mission with our responsibility to safeguard the natural systems upon which our quality of life depends.

- **Opportunities exist within the NAVFAC Environmental Restoration (ER) Program to minimize a remedy's environmental footprint and support EO 13423**

- reducing energy and greenhouse gasses; promoting renewable energy; reducing water consumption, air emissions, waste generation, community impacts; and improving safety

- **"Green / Sustainable" optimization of Navy ER Sites will:**

- Complement current optimization approaches
- Draw on already existing methods and technologies
- Demonstrate commitment to long-term stewardship

# Navy's Path Forward



- **DON Optimization Workgroup recently tasked by HQ**
  - Determine how Optimization and Tiger Team reviews could incorporate and evaluate methods to utilize green / sustainable engineering and reduce environmental impacts of remedies
- **Defining scope and developing Navy's general approach**
  - Consider sustainability during remedy selection and optimization of existing remedies
  - Life cycle approach
  - Parameters (GHG footprint, energy use, resources consumption (water, land), air emissions, community impacts (noise, odor, traffic) collateral risk)
  - Determine metric(s) of success



# Navy's Path Forward (cont.)



- **Case Studies for Lessons Learned**

- Plan to apply & evaluate sustainability tools at ~6 Navy sites. Selection of sites and tools is in progress
- Sites in remedy selection and remedy O&M phases
- Focus on existing tools

- **DON Optimization Policy & Guidance Documents**

- Currently optimize for cost, performance of the remedy, and timeliness in meeting cleanup objectives
- Does not mention minimizing a remedy's environmental footprint
- Sustainability considerations to be included in future revisions of guidance documents

# Navy's Path Forward (cont.)



- **Outreach to Navy RPMs**

- Fact sheet
- RPM Newsletter articles
- T2 e-mail announced USEPA Green Remediation Primer and Website
- Navy/Marine Corps Cleanup Conference Presentations
- Future RITS Topic

- **NAVFAC ESC Participation / Partnering**

- SURF Meetings, including supporting development of a white paper
- ITRC Team - Green Sustainable Remediation Team
- FRTR Sub group - Green Remediation
- Partner with AFCEE and USACE to address sustainability from DoD perspective

- **NAVFAC ESC proposal to Navy Environmental Sustainability Development to Integration (NESDI) Program**

- Proposal Under Review for FY10 Start

# Example – Sustainability Evaluation of Soil Remediation Alternatives



- **Navy site in remedy selection phase**
- **Remediation Alternatives**
  - S2: Limited excavation, off site disposal, engineered cap, ICs, & monitoring
  - S3: Excavation, off site disposal, ICs, & monitoring
  - S4: Limited excavation, off site disposal, SVE, ICs, & Monitoring
- **Battelle performed this evaluation**
- **Feasibility study under review**

# Example – Sustainability Evaluation of Soil Remediation Alternatives



## •Sustainability Parameters

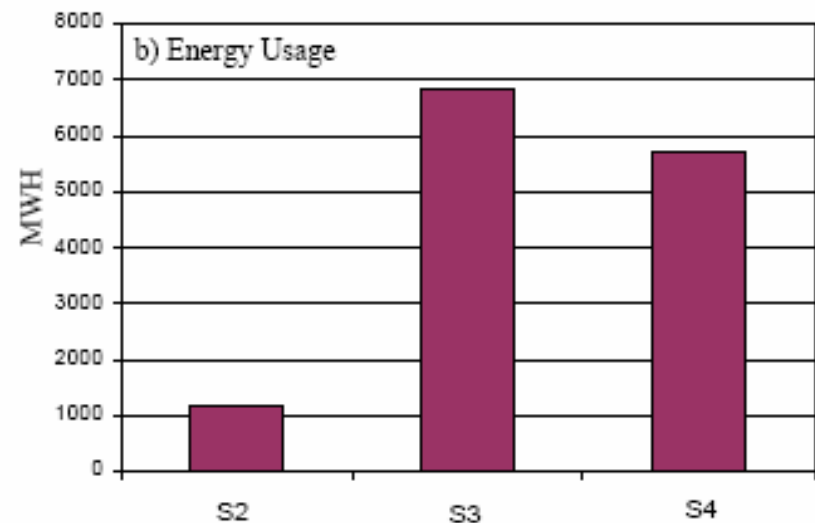
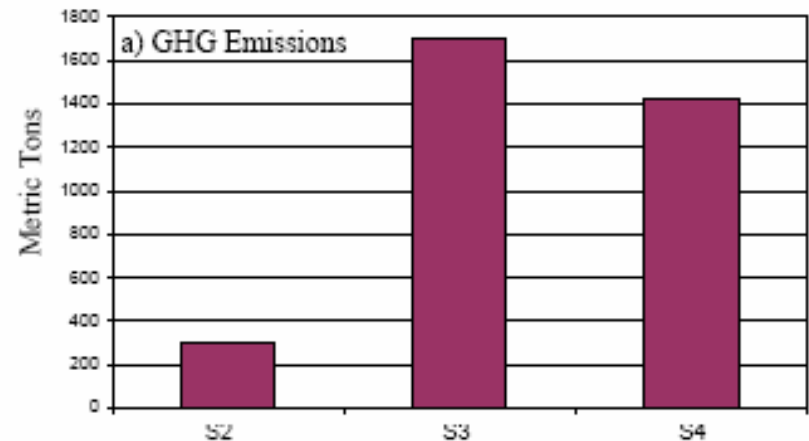
- GHG Emissions:  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ , other gases - reported as  $\text{CO}_2$  equivalents
- Energy Use: Electricity and fuel
- Air Emissions:  $\text{NO}_x$ ,  $\text{SO}_x$ , PM, VOCs
- Collateral Risk: fatality and injury from on site remedial activity and off site actions (transportation)
- Resource Consumption



# GHG Emissions and Energy Usage



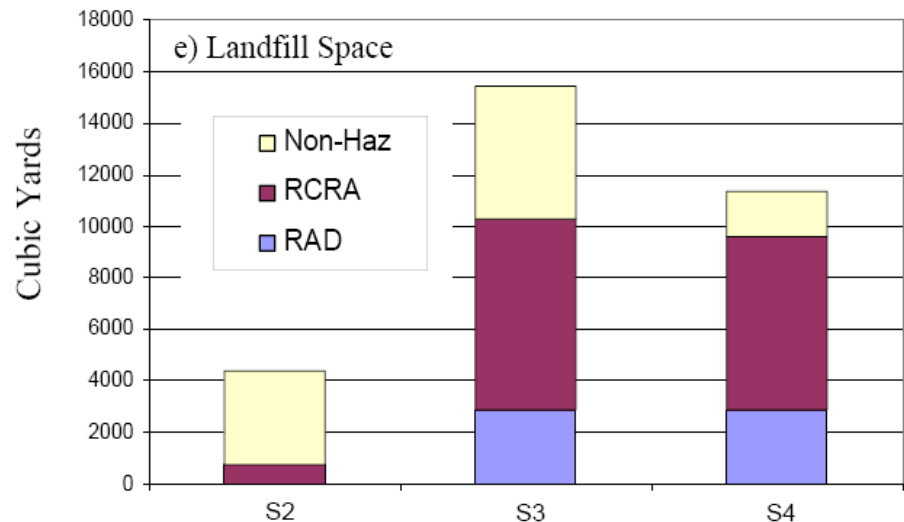
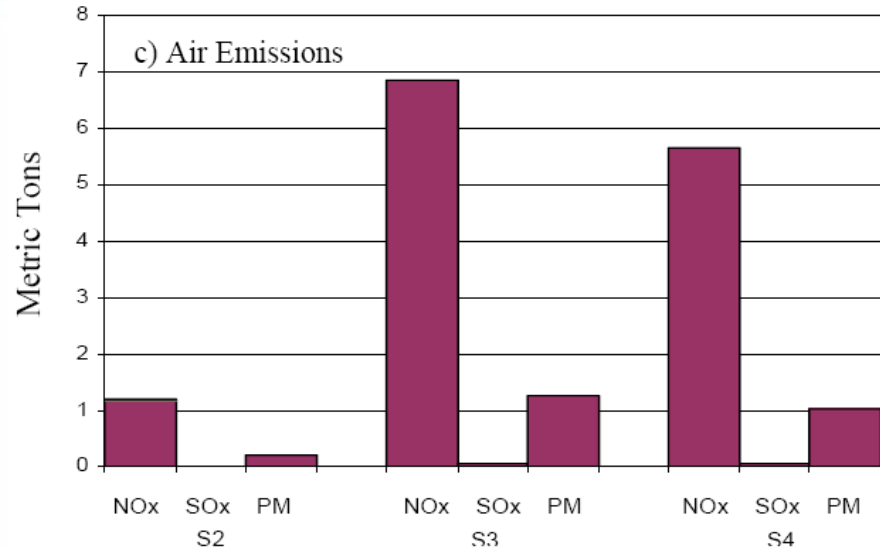
- GHG emissions and energy usage show similar trends
- Largest contribution - CO<sub>2</sub> emissions from fuel consumption during excavation and transportation
- Calculate life cycle impacts from remedy components and consumable materials



# Air Emissions and Landfill Space



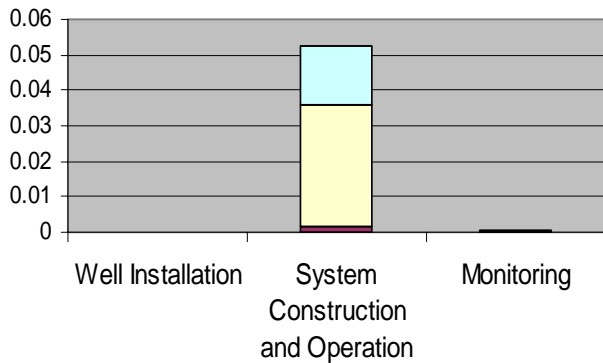
- Air emissions are mostly from heavy equipment use on site and transportation
- Largest source is diesel fuel
- Off site landfill disposal
- High cost for excavation and disposal of Rad waste in alternatives S3 & S4
- Total Cost:
  - S2 - \$1.2 million
  - S3 - \$10 million
  - S4 - \$9.8 million



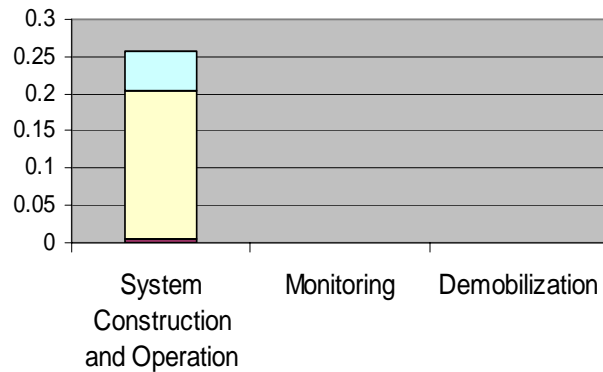
# Collateral Risk - Injury



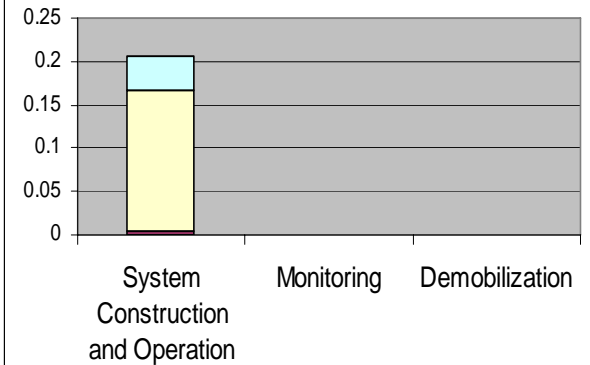
S2 - Collateral Risk - Injury



S3 - Collateral Risk - Injury



S4 - Collateral Risk - Injury



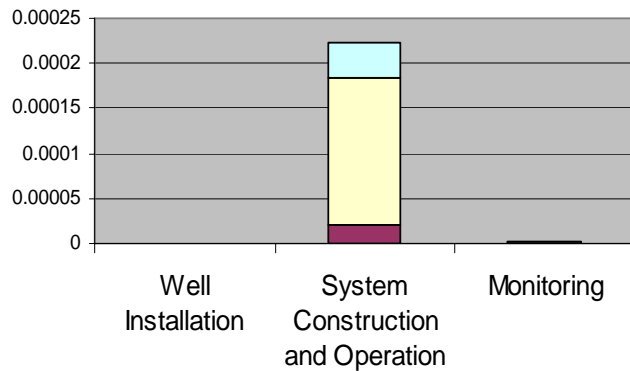
■ Equipment Use on site ■ Transportation - Personnel ■ Transportation - Equip/ Materials

- Injury risk is low for this site
- Most of the risk is from transportation of soil and fill

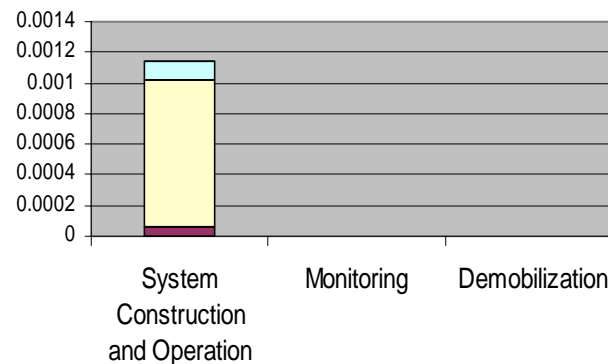
# Collateral Risk - Fatality



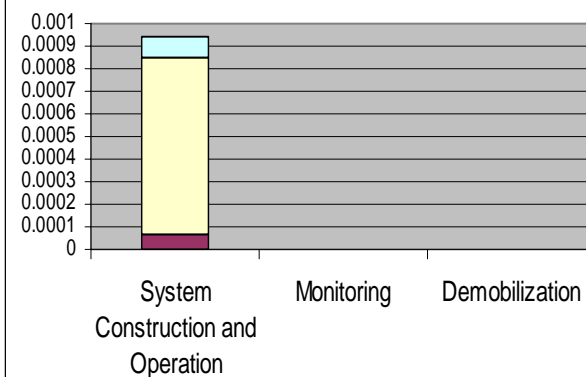
S2 - Collateral Risk - Fatality



S3 - Collateral Risk - Fatality



S4 - Collateral Risk - Fatality



Equipment Use on site    Transportation - Personnel    Transportation - Equip/ Materials

- Fatality risk is low for this site
- Most of the risk is from transportation of soil and fill

# Renewable Energy Sources at ER sites



- On-going efforts to identify potential sites with high energy demand – potential candidates for renewable energy systems
- Some current applications
  - Remote sites in Adak Alaska installed wind turbines for free product recovery
  - Camp Pendleton Project – Excavated contaminated soil using clean diesel technologies, biofuels, and retrofitted equipment. Used rail for soil transportation to disposal facility



# Summary



- **DON taking actions to integrate green / sustainable practices with remediation projects**
- **Informational resources becoming available to Navy RPMs**
  - RPM newsletter and T2 updates
  - Websites
  - Fact sheet
- **DON Optimization workgroup tasking**
  - Identify sites – in progress
  - Conduct case studies
  - Evaluate tools
  - Develop guidance
- **Working with other agencies for sharing lessons learned**

# Questions